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ON THE ASSOCIATION FUNCTIONS OF THE CEREBRUM

THE relation of the brain to mental processes or, more broadly, that of mind and body, is a topic of perpetual interest. Numerous explanations of this relation have been suggested and discussed, and much has been written by the monist and by the dualist, by the interactionist and by the parallelist. When taken from his scholastic environment and off his philosophic guard, even the idealist will, at times, admit that, as a working, every-day hypothesis, we may say that the brain is closely associated with mental states or with consciousness. It is with this topic the present paper deals, but with the intention, and, in fact, with the explicit avowal, not to review the different hypotheses or to discuss the subject from a philosopher's standpoint. It is in a less general way that the subject will be approached, viz., by recording certain facts regarding the activities of the cerebrum and certain facts of a mental order, and by deductions from these facts.[1]

Our present knowledge regarding the functions of the cerebrum may be briefly summarized as follows: (*a*) the relation of muscles or of movements of bodily segments to certain areas of the cerebral cortex is well recognized; (*b*) we know something of the relations of sensations to other cortical areas, or, to speak more exactly, we know something of the relation of injuries of these areas to disturbances of certain sensational processes; (*c*) little is known of the relation of perceptual and associational mental states to any part of the cerebrum, and none of the hypotheses regarding this relation is in conformity with the known facts and none is widely accepted. Before taking up the special topic of the present paper, the formulation of an hypothesis regarding the functions of the so-called association areas, it will be well to epitomize the generally accepted facts regarding cerebral localization. Some of these facts are of special value for the understanding of the hypothesis that is to be presented.

[1] In this connection it may be stated that the description of events will be observed to be rather interactionist, but it is to be noted that this is done without epistemological implications, and solely for convenience of expression.

Anatomical Divisions of the Cerebral Cortex.—The fissures of the cerebrum are so well marked, and many of them so constant in location, that gross anatomical divisions of the brain into frontal, parietal, etc., lobes were made with these as bounding lines. It was thought that these areas were quite distinct and that the division had a functional as well as an anatomical value. During the past few years, however, numerous histological studies of the structure of the cortex have shown the crudeness of the divisions by sulci, and a finer differentiation into areas according to cell and fiber lamination has been made. Some of the results of these studies are shown in the accompanying figure in which are marked the divisions on the lateral

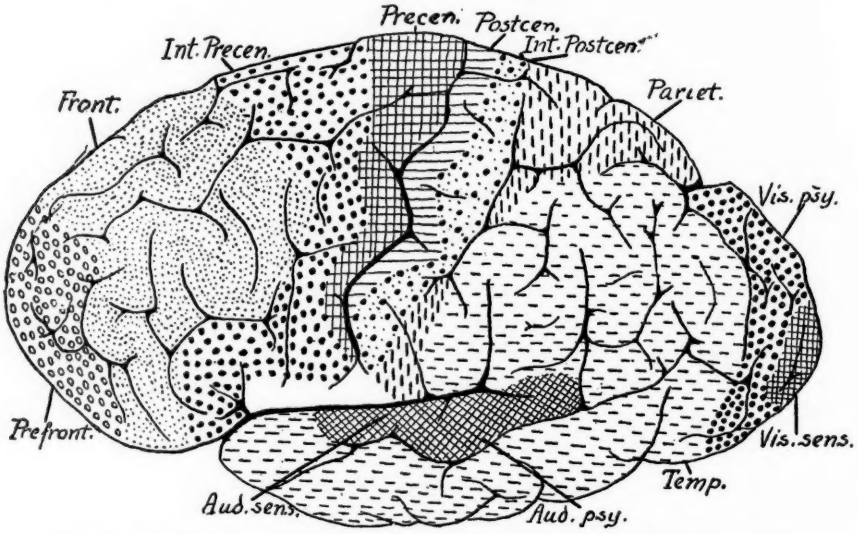

FIG. 1. Cortical areas, differentiated by cyto- and myelo-architechtonic. Adapted from Campbell.

aspect of the left hemisphere.[2] It will be seen that the frontal lobe (anterior to the fissure of Rolando) is divided into four areas not differentiated by lines of sulci; the parietal, temporal, and occipital

[2] From A. W. Campbell: "Histological Studies on the Localization of Cerebral Functions." Cambridge, 1905. Campbell's results are, in the main, similar to those of other investigators, although it should be stated that in certain details they have been criticized. For the technicalities and for finer differentiation the reader is referred to the following publications. K. Brodmann: various articles in *Journal für Psychologie und Neurologie*, 1902–1909, and "Vergleichende Lokalisationslehre der Grosshirnrinde in ihren Principien dargestellt auf Grund des Zellenbaues," 1909. J. S. Bolton: *Philosophical Transactions*, CXCIII., 1900; *Journal Mental Science*, 1905–1908; Recent Researches on Cortical Localization, in L. Hill's "Further Advances in Physiology," 1909.

areas are divided into eight distinct zones, some of which are, and some of which are not, bounded by constant fissural lines. These cortical areas are supposed to have different functions, but the comparison of clinical and physiological data with the structural studies is not yet satisfactory in regard to all areas. We shall need, therefore, to take for consideration at one time several areas and attempt to show the functions so far as they are known.

Frontal and Prefrontal Areas.—Of definite functions of this large area we have comparatively little knowledge.[3] Ferrier found movements of the head and eyes to follow stimulation of the frontal lobes, but it is not certain that these results were due to the stimulation of an area other than the intermediate precentral region, experiments on which are mentioned below. Respiratory and heart rhythm changes have been found to accompany stimulation of the frontal regions (Langelaan and Beyerman), and these results have been taken as indications of an "attention" function of this area. Spinal reflexes are inhibited or their latent periods prolonged when the frontals are concomitantly stimulated and the latent periods are shortened after extirpation of the frontals. An inhibition function has, therefore, been assumed to have its seat here. Intellectual defects are said to follow injury to or destruction of the frontal lobes, and there is much clinical and physiological evidence in support of this (Phelps, Mills, et al.). The frontals are underdeveloped in cases of mental deficiency and they undergo atrophy in cases of dementia (Bolton), which facts have led to the statement that this "region is concerned with attention and the general orderly coordination of psychic processes." Following the extirpation of the frontals in cats and monkeys I have found no definite motor inabilities, but there were distinct losses of associations (habits). Finally, we may mention that centers for motor speech associations have been located in the left frontal, one for writing and the other for verbal speech.[4] The verbal speech area is included in the intermediate precentral

[3] I have considered in some detail the facts regarding the functions of the frontal and prefrontal regions in a monograph ("On the Functions of the Cerebrum: The Frontal Lobes," *Archives of Psychology*, 1907) and the present account is a brief presentation of these facts.

[4] At this time we shall not need to consider the current controversy regarding aphasic conditions and the brain localization of speech functions. In this article I take the generally accepted views. I am aware that some doubt has been cast upon the value of the older conclusions drawn from the available aphasia data, but on the other hand we have a number of facts that can well be understood only upon the older basis. Marie's contribution appears to be valuable in a negative or critical way in that he calls attention to loose methods of clinical and pathological examination, but the positive value of his deductions appears slight.

area by Campbell, but Brodmann and Elliott Smith note distinct differences in structure between this and the intermediate precentral.

Precentral and Intermediate Precentral Areas—From early times a connection between voluntary movement ability and the cerebrum was suspected. Head injuries were noticed to be followed at times by paralyses and at times by convulsive movements that could not be voluntarily controlled. When autopsies were performed, definite lesions were found associated with these movement disturbances. These observations were supplemented by stimulation experiments by which it was found that the excitation of certain cortical areas in the dog was accompanied by movements of the head, trunk, or limbs. The original observations of Hitzig have been confirmed and supplemented by numerous investigators. The later work, by refinement of methods and especially by the use of the brains of monkeys and man, has given us an accurate map of the areal distribution of motor function. On the brain of the chimpanzee, which in this respect closely resembles that of man, Sherrington and Gruenbaum found

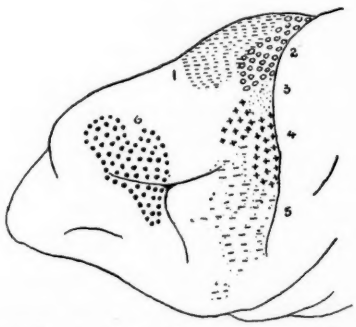

FIG. 2. Cortical motor areas in the monkey. Adapted from Vogt. 1, tail and vertebral column; 2, foot, leg, and thigh; 3, trunk; 4, arm and hand; 5, face, neck, tongue, jaw, ear, and eyelid; 6, eyes and lids.

the motor area to be anterior to the fissure of Rolando. These results have been confirmed by the Vogts, who not only stimulated many points, but who have recorded the location of each stimulus and the character of each resultant movement. The combined results of the Vogts showing the relation of the pre-Rolandic cortex to movements are represented in Fig. 2. On careful stimulation of the cortex, both the English and the German investigators found coordinated, but rather simple, types of movement of different parts of the body.

These results have been partly confirmed on man by a similar method of stimulation, and the results of clinico-pathological examinations are in accord with them. Indeed, so much has already been accomplished in this direction that we are justified in concluding

that there are similar arrangements of the cortical motor areas in man and in the higher apes. The movements produced by stimulation of the precentral cortex, as has been mentioned above, are simple, but coordinated, and similar to those of a simple reaction. In addition to the areas producing this simple type of movement, Sherrington and Gruenbaum and the Vogts found a second area in the frontal cortex, the stimulation of which was accompanied by movements of a more complex character. In the diagram this area is marked 6. Stimulation of this region produced associated movements of the eyes, conjugate in character, movements of the eyelids, and, at times, combined movements of these parts and of the head. These movements and this area are probably the same as the movements and area found by Ferrier and mentioned in connection with the frontal regions. Both are doubtless the intermediate precentral area.

Postcentral and Intermediate Postcentral Areas.—Both the pre- and post-central gyri were formerly thought to have a motor or a combined motor and sensory function. The experiments on the precentral areas have, however, established the true limits of the motor area, and it is almost universally admitted that the postcentral cortex has not a direct, but only a remote, connection with the initiation of motor impulses. Observations on man have definitely settled that the postcentral convolutions are concerned with certain sensational processes, the receptor organs for which lie in the skin and in the underlying tissues. The most interesting and the most conclusive evidence of the association of this area with the skin sensations has been obtained by Cushing, who stimulated this area in a conscious individual whose brain had been exposed preparatory to an operation. At the time of the stimulation, the subject reported peculiar sensations from the arm which were obviously not due to an external stimulus. It is also to be noted that certain hypesthesias and anesthesias in man have been associated with tumors, hemorrhages, and other lesions of this part of the cortex. Lesions of the neighboring area, the intermediate postcentral (possibly also of the neighboring association area), produce the condition known as astereognosis. Stereognosis, it will be remembered, is the name given to the ability to recognize objects from the sensations received from the skin and motor apparatus. Although in clinical works this is called a sensation, we know it is a complex of sensations and is allied to the associations of speech.

Auditosensory and Auditopsychic Areas.—This part of the temporal lobe is associated with the sense of hearing. By means of the training-extirpation method extensively used by me, Kalischer was able to show that when this area was extirpated, animals failed to respond to tones to which they had previously learned to respond.

Earlier investigators had noted the failure of animals to respond to sounds after destruction of the temporal lobes, and, although their methods are more open to criticism than those of Kalischer, the facts warrant the conclusion of a close connection between this part of the cerebral cortex and hearing. Nothing more of a definite character is known of the functions of the so-called auditopsychic region, unless we are to assume that Campbell intends to include therein part or all of the area for sensory (auditory) speech. In addition to the apparent auditory function of this area, it has been found that stimulation is followed by movements of the ears (Schäfer). The movements are similar to those produced by stimulation of the precentral (probably more like those from the stimulation of the intermediate precentral) area. They have, however, a longer latent period, and this fact indicates that the movements are not directly initiated from this area.

Visuosensory and Visuopsychic Areas.—Of the cortical sensory functions, that for vision is the most accurately marked out. Many observations on the relation of vision to the cortex have been made, and Henschen in particular has given us the results of clinical and pathological studies that show an almost accurate representation on the cortex of the different parts of the retina. Extirpation or destruction of this area on one side is followed by an hemianopia; extirpation of both, by complete blindness. The neural pathways from the eyes to the occipital cortex have been carefully investigated, and there seems little reason to doubt a close relation between the occipital lobes and visual sensations. Reference to Fig. 1 will indicate that in the occipital region at least two areas are supposed to be connected with the visual apparatus. To these areas Campbell gives the names visuosensory and visuopsychic, respectively. The visuosensory area has been referred to above as physiologically and clinically well understood, but it should be stated that there is little evidence for a functional differentiation of this area from the so-called visuopsychic. Some observers have located in the visuopsychic region an area which is supposed by them to be concerned with color vision, but this localization is not widely accepted. In the same area a center for visual speech has also been located by some, but it is certain from recent work that the speech center must be localized, if at all, within the adjacent association area. From stimulation of this visual area Schäfer obtained coordinated movements, and found, as in the case of the temporal lobes, a longer latent period than for the movements produced by stimulation of the precentral cortex.

Parietal and Temporal, or the So-called Posterior Association Areas.—Of this large portion of the cerebral cortex the functional relations are not understood as well as those of the frontal association

area. In connection with the consideration of the temporal (auditosensory and auditopsychic) region, mention was made of a possible relation of this area to speech function; in connection with the occipital (visuosensory and visuopsychic) area a similar functional relation was mentioned as a possibility; and in connection with the intermediate postcentral convolutions stereognosis was considered. On account of the inaccuracy of the cerebral examinations it is not sure that these functions belong to the areas mentioned, and, in fact, it is likely that part or all of these functions are subserved through the cells in the posterior association area. Following extirpations in animals, I have found losses of associations similar to those resulting from extirpation of the frontal lobes, and this fact would indicate the use of this area in the formation of habits. Although not much weight can be placed upon it at the present time on account of the small amount of material that has been examined, it may be mentioned as an additional fact that in certain types of intellectual men the posterior association area has been found to be more highly convoluted (supposedly better developed and extensively used) than the frontal portion of the cerebrum.

Although the consideration of the known functions of the cortical areas has been necessarily brief, sufficient indication has been given that the motor and the sensory (hearing, touch, vision) cortical mechanisms are understood and localized. Opposed to this definiteness there is a vagueness in regard to the functions of the association areas. Some few facts are known, but there appears to be more or less haze about the subject, and writers tend to avoid it. Following is a summary of the known facts regarding the two large association areas: (*a*) in the frontal association area are located centers of motor speech and writing; (*b*) in the posterior association area are centers for what clinicians call the understanding of auditory and visual speech; (*c*) the frontal regions are clearly associated with the production of movements, especially those of a complex character; (*d*) in the posterior association area (or in the closely associated intermediate postcentral cortex) is an area for the understanding, through the medium of the skin and motor sensations, of the character of objects; (*e*) the results of my work on monkeys and cats indicate that both the frontal and the posterior association areas are concerned in the formation of simple sensorimotor habits.

These facts give the clue for the understanding of the relation of these association areas and of their functions. All the physiological and all the clinical data point to the use of the frontal lobes for the initiation of complex motor processes. All the physiological and all the clinical data point to the use of the posterior association areas for the combination or the association of sensory processes.

The results that have been mentioned and the two conclusions that have been drawn from the results, led to the formulation of the following scheme or hypothesis regarding the cerebral processes that take place in these areas, and which result in the so-called higher intellectual processes, or, as we may call them, associations.[5] Fig. 3 indicates the conception of the cerebral connections. It is generally admitted that we have cerebral areas which receive impulses through the afferent sensory neurones and areas (*M*) which give rise to or initiate impulses which go by way of the efferent neurones to the muscles and glands of the body. The direct connections and activities of this kind of neurones in the spinal cord give rise to reflexes, and it is probable that similar reflexes occur through the activity of the cerebral neurones, although this matter is not settled. It is most likely that in the cerebrum at least two, and per-

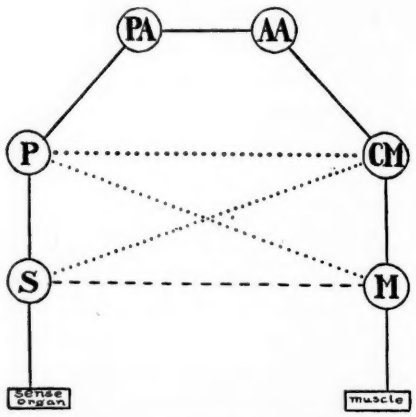

FIG. 3. Scheme of cerebral connections associated with mental processes. *S*, sensory area; *P*, perceptual area; *PA*, posterior association area; *AA*, anterior association area; *CM*, area for coordination of movements; *M*, simple motor area.

haps four, other neurones must function to produce a cortical reaction accompanied by conscious assimilation and conscious effort.

In the formation of an association many, perhaps thousands, of cells in different areas of the cortex are active. An associational connection between the sensory and the motor ends is, I believe, always mediated through at least six neurones or sets of neurones. To take a visuomotor association as an example, it is conceived that the following cortical areas are successively set in activity: visuosensory, visuopsychic, posterior association, anterior association,

[5] The view here expressed has been briefly given in the *Psychological Bulletin*, Vol. V., 1908, p. 219, note.

intermediate precentral, precentral. The activities of the visuosensory and the visuopsychic give us perceptions, the activities of the intermediate precentral and the precentral give us reactions, and the two association areas are connecting links between the sensory and motor ends, and between the two hemispheres.

That both association areas are used in associations (physiologically and psychologically) is established by the phenomena of aphasia and apraxia. That both are utilized in the formation of definite modes of reaction is shown by the loss of associations by animals when either is destroyed. The anatomical connections of these areas with each other and their connections with other cortical cells have been sufficiently well studied to show a close relation of the areas to each other and to the projection spheres. That both are important, not silent and useless, parts is proven by the occurrence of mental defects with disease or destruction of either.

Evidence is at hand to show that the frontal areas have a more direct connection with the motor areas than do the posterior. The variations of reflex movements concomitantly with variations in frontal lobe activity have been mentioned. That the frontals have a more direct relation to motor processes, and are for motor associations, is a reasonable deduction from the apraxia studies of Liepmann and others. The older cortical localizations of vocal speech and writing, although they may need some modification to conform to recent findings, also support this view; and, finally, we may mention that the frontal region degenerates more than other portions when there is an inability of adjustment (dementia), and that it is underdeveloped when there is a condition of imbecility.

It is by a continual process of adjustment that man has attained his place in the world, and the variety of activities so characteristic of him is made possible through the frontal regions. The direct motor responses of an animal need no large amount of association elements, but the indirect reactions of man require an amount of coordination that is supplied by the association cells. There is the increased use of the hands, of tools, of the legs, and of other mechanisms for propulsion, requiring new adjustments and new associations; and the impulses to act are paralleled by a similar number of impulses to check activity, or tending to check the primary, reflex-like impulses.

The posterior areas are, from the accounts given above, clearly more closely allied with the sensory spheres. The large size of this region in intellectual men is only one indication of this, but the sensory aphasias and other similar processes that are located here by clinicians confirm this view.

We may now return to the scheme of cerebral connections that

has been suggested (Fig. 3). Here are represented all the kinds of cerebral connections that clinical and physiological studies have indicated. The centers *M* and *S* are to be conceived to be multiple, and to include all the so-called subsidiary centers, *e. g.*, those in the basal ganglia and in the spinal cord. The direct functional connection of these centers results in reflexes of different kinds. But as the stimulus reaches the organism at certain times and under certain conditions, the impulses are transmitted toward the centers *P*, which are located in different parts of the cortex depending upon the stimulated end organ. In turn the posterior association area is stimulated (*PA*), and thence the coordinating motor area (*AA*), and then a second, but less extensively general, coordinating center (*CM*), and finally the center (*M*) from which the impulses arise that go by way of the spinal neurons to the muscles and glands of the body. This sixfold association process appears complex, but it is doubtless simpler than the actual physiological processes. None of the centers noted on the diagram represents one cerebral neuron; most of them must represent many, perhaps thousands, of neurones which act together to produce the required effect of a reaction following a definite stimulus. Nor must it be understood that all cerebral activities take the long path. From the studies on animals of the relation of the association areas to the learning and retention of habits, it is plain that after an association (habit) is formed, the upper (*AA* and *PA*) areas may be dispensed with, and the reaction obtained through the lower centers (*P* and *CA;* or *S* and *M*). It is likely that most men use the association areas less than once during a thousand stimulations of a sense organ. It is certain that some men use the association areas even less than this, and those of defective development, such as idiots, have probably none of their frontal or posterior association cells active throughout the day.

The hypothesis of cerebral mechanics that has been advanced, helps to understand the various conflicting views of aphasia: the diaschisis of von Monakow, the Broca localization, the dementia view of Marie. From this point of view we may also understand the localization of attention and inhibition centers in the frontal lobes, and at the same time we appreciate why there have been ardent advocates and opponents of "intellectual centers" in the frontal and the posterior association areas. In believing in localization, we need not accept the crude views of Gall and Spurzheim; in fact, localization studies of recent years prevent this. Nor do we need to accept the views of Brodmann who believes that each of his thirty-eight anatomical areas represents a different physiological or mental function. At the present time, it is premature to speculate regarding all the distinct anatomical areas, but we have sufficient anatomical,

physiological, and psychological evidence to warrant the conclusions that have been drawn regarding distinct functions for the hitherto little understood association areas.

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THE PLACE OF THE TIME PROBLEM IN CONTEMPORARY PHILOSOPHY[1]

THIS paper is designed first of all to present a strategic analysis of the main situation in contemporary Anglo-American philosophy: an analysis which shall to some extent break up current systems into the discriminable tendencies or separate dialectical motives that have gone to the formation of them, which shall draw out the lines of opposition or congruency between the several elements of current opinion, shall ascertain upon what points there is most nearly general agreement, and shall discover by what lines of argument those who conceive it important to refute a given doctrine may proceed against the enemy with a maximum of directness, with a minimum waste of ratiocination, and with the strongest supporting columns. Just how all this bears upon the special topic assigned for this discussion will appear in the sequel.

I

Ignoring minor excursions and alarums, the situation—the exceedingly interesting and live situation—which we are concerned to analyze may be said to be something like this: Upon one side, but a little in the background—still influential, yet, whether deservedly or otherwise, assuredly of diminishing influence—stand the lately dominant neo-Kantian types of systematic philosophy, of which the most essential elements may be called, for short, rationalism in epistemology; "eternalism" in the conception of the meaning of truth and the nature of "ultimate" reality; idealism; and "this-worldliness," or a belief in the necessity of giving a positive place, value, and significance in reality to the concrete, finite, temporal existences of ordinary experience. (This use of tags and labels, in place of explicit statements of the propositions asserted is, I know, odious and, with inexpert audiences, usually befogging; but on this occasion I hope it may be permitted, in the interest of brevity, especially since the "-isms" in question are for the most part presently to be

[1] A paper read as part of a prearranged discussion of the topic, before the American Philosophical Association, at its meeting at Yale University, December, 1909.

defined.) Against this once official and comfortably established doctrine, there now aggressively press forward, sometimes singly, sometimes in diverse combinations, several new tendencies—or older tendencies revived. The four which here most concern us are "anti-intellectualism"; pragmatic nominalism, or radical empiricism; realism; and temporalism in metaphysics and epistemology. These are at one in their opposition to eternalistic idealism, whether that be of the monistic or the pluralistic sort. All this is well known to everybody. But I now come to the five points which I primarily desire to make.

First: The four newer tendencies in question are severally not equally opposed to all four of the elements or logical motives which enter into the epistemology and metaphysics of contemporary idealism. The logic of the new realism is, to be sure, hostile to idealism; and what I have called temporalism is obviously the antithesis of "eternalism"; but it is not, on the face of it, clear that temporalism may not form as congenial an alliance with idealism (as such) as with realism. It is not clear that realism is or need be anti-intellectualistic. And it is far from clear that a truly radical empiricism or pragmatic nominalism may not lean rather to idealism than to realism. In any case, moreover, *none* of the new tendencies has in it any hostility towards what I have called the this-worldliness of all genuinely modern idealism, its unwillingness to define reality in terms that are but the blank negation of all the characters of concrete, empirical existence.

Secondly: The spokesmen of the newer tendencies are not agreed among themselves as to the combinations or groupings in which those tendencies may properly be joined together. It is rarely safe in philosophy to assume that any of us really understands what another means—and we all of us have a curious shamefastness about being classified; yet I suppose I may say (if I refrain from mentioning any names) that there exist realists, or near-realists, who are not pragmatic nominalists, pragmatists who are not realists, rationalists who are not idealists, and perhaps temporalists who are neither pragmatic nominalists nor realists. Yet,

Thirdly: It is important to note that in the combinations nowadays made up out of two or more of the tendencies mentioned, there is nearly always one constant (though the presence of that constant is not always emphasized nor made very explicit), namely, some sort of temporalism. You may find *mere* temporalists, or realists who are temporalists, or idealists who are temporalists, or radical empiricists who are temporalists. And though you may doubtless also find combinations in which this factor is lacking, it seems to be the one that appears more often than any other in the systems of doc-

trine now most growing in vogue and influence—to be the point about which there is the nearest approach to agreement among our philosophical innovators.

Fourthly: This implies that the element in the idealistic systems against which there is the most general and most direct opposition is not its "concreteness" or "this-worldliness," against which, by itself, there is no opposition at all; nor yet its rationalism; nor its idealism as such, against which the opposition is thus far by no means universal; but its epistemological and metaphysical eternalism. Here, then, is the situation thus far: a rather common antagonism to one of the four elements in modern idealism; a rather general sympathy with another of its elements, namely, its real respect for concrete particulars of experience. Now,

Fifthly: There is especial reason to consider that these two elements—the second and the fourth, the eternalism and the "this-worldliness"—of the idealistic systems are essentially incongruous *inter se;* that if one is to be taken, the other must be left; that unless the temporal or successive character of experience, and the reference to temporal situations, and to truly pending issues, of the judging process, be regarded as merely senseless and illusory appearance, there can be neither any such thing as an absolute and eternal and completed truth, nor any such thing as an absolute and eternal and perfect reality or concrete existence.[2]

Now, if these five points are duly reflected upon, the strategy of profitable discussion seems to become pretty plain. The opponents of eternalistic idealism find common ground upon which they can join forces in the opinion that truth can be interpreted only as relevant to and colored by a temporal process, and that reality is known or conceivable only as implicated in temporal process. And this ground lies just opposite the point of greatest internal weakness in the present-day idealistic systems, namely, the obligation which they have accepted to refrain from merely denying or ignoring the empirical characters of reality as it primarily presents itself—which characters include that of temporal succession; the obligation to find in the eternal and absolute room and meaning and pertinency

[2] If I were attempting a complete enumeration of the important newer proclivities of contemporary philosophy it would be necessary to mention at least two others: "instrumentalism" in the theory of knowledge, and what I have elsewhere called "radical evolutionism"—the doctrine that, in the words of E. D. Fawcett, "Nature is continuous creation; it is not only remade from moment to moment, but its history will teem with incessantly *novel* fact" ("The Individual and Reality," p. 280). Both these doctrines are special, though significantly enriched, phases of temporalism; their inclusion would not, I think, vitiate the generalizations made in the text. To the former some reference is made later in this paper.

for the changing and relative and finite. Into this part of the lines of the modern idealists the whole army of temporalists may enter unopposed, since at this point idealism itself has already been penetrated by temporalistic concessions. This point once entered and possessed, temporalists may then conceivably turn its guns against the eternalism which forms the other extreme of the idealistic position. That done, something definite will have been settled; though much, doubtless, will still remain for settlement, namely, the fate of the remaining factors, rationalism, and idealism itself. But even these remaining issues can then, I think, be attacked in an especially direct and effective manner. We shall have to ask, next, simply these two questions: First, does the recognition of the ultimate "realness" of temporal becoming best harmonize with realism or with idealism? Second, does it permit of that confidence in the commensurability of reality and conceptual thought which is called by its critics "intellectualism"?

Such, in highly formal outline, I would suggest, is the way in which the logical forces available in this discussion are at the outset disposed. From this military map it appears that the key to the whole position of neo-Kantian idealism—and especially of that idealistic monism which Professor Royce has for many years so brilliantly defended—may be considered to lie in the point where the eternalism of that doctrine is united with a species of concrete temporalism. It is equally the case that the key to the positions, alike of all the new anti-absolutist epistemologies and of the new realism, lies in their temporalism. If the eternal entities of absolute idealism can be shown to be incompatible with the "concreteness" of the universal being that is the highest metaphysical conception of that doctrine, then *that* alliance of philosophical tendencies is once for all broken up in confusion. But on the other hand, if the eternalist can show that any recognition of the distinction between truth and error, and even any explanation of the possibilities of temporal experience itself, implies the existence of an eternal truth and an eternal knower, then (for reasons which it would here be superfluous to point out) with the triumph of the arguments for eternalism, idealism and "rationalism" would triumph also, and all four of our newer tendencies would be put to rout at once.

II

The relative positions and the strategic significance of the several issues being thus indicated, and the key—or at least, one key—to the situation being thus determined, it now becomes possible to begin an examination of the nature and force of the arguments at the dis-

posal of the two contending parties at the point where combat is joined—that is, in the controversy between eternalism and temporalism. What precisely is meant by the affirmation of the "eternity" of truth and of "ultimate" reality, and upon what grounds is that affirmation based? And what, on the other hand, are the reasons for the contention that truth is wholly an affair of the world of temporal experience, and that all reality belongs within the temporal order and is subject to lapse, change, and evolution? And, finally, how far do the reasons—and not merely the conclusions—on the one side meet and fairly oppose the reasons on the other side? Is it, as it sometimes seems to be, a situation in which each is irresistible in attack, but powerless when upon the defensive?

Manifestly, these questions can not be fully and convincingly answered in this paper. Yet I shall try to indicate what seem to me the two or three most important dialectical considerations on either side, to examine their more obvious relations, and to express at least a dogmatic opinion of their relative potency.

The notion of an eternal being arises, perhaps, most naturally and plausibly when men reflect a little upon what they seem to mean by the trueness of a judgment. In this matter we must, I think, ascribe to the average man a *mens naturaliter platonica*. When the question is raised at all, most people, so far as I can ascertain, tend to think of the mere truth of any proposition as somehow subsisting in a realm where all questions of date are irrelevant. Through the windows of a passing moment of temporal experience a man may, when he believes he has arrived at a true judgment, seem to himself to be looking out upon a world of timeless validities. Platonistic philosophy, even in its earlier modern forms, has been prone to conceive of this "eternity of truth" as holding only of the so-called eternal truths—of the relations of implication between the fundamental abstract concepts, the unalterable "simple natures" of things. But this is surely an inadequate philosophical transcription of the naïve eternalism, the deep-rooted anti-pragmatism, of the epistemology of common sense. If the argument holds at all it holds of *all* valid judgments. If the judgment be true, it should seem, to those so minded, to have been true before any temporal mind bethought itself of that truth—it would have been true if no such mind had ever chanced to think of it—it will be true when all such minds have forgotten it—and so on, *in sæcula sæculorum*. That Socrates would drink the hemlock did not become true first at the moment of his drinking it; that the event had a date does not (to most men) imply that the trueness of all propositions relating to that event likewise has a date. To the natural man, I am sure, the idea of a

judgment's becoming true seems a wild paradox. Now, this way of thinking is none the better for being natural to the unchastened mind. But it is at all events to be remembered that the so-called "rationalist" in epistemology is in this matter probably on the side of naïve common sense, rather than the humanist or the pragmatist. Eternalistic idealism is the technical interpretation and elaboration of the vague eternalism of the average man's apprehension of the category of trueness. The eternalism of common sense, however, is after all only a phase of the general tendency of the undisciplined intellect to hypostatize, to take its concepts absolutely and unrelatedly; this unreflective disposition to think of truth as somehow dateless would, if left to itself, work out into a sort of nebulous Platonic realism, such as you may often detect in rustic philosophers who have perhaps never heard of Plato. But eternalistic idealism is idealism as well as eternalism; and here, it appears to me, is where it parts company both with the epistemology of the average man and with the principle of contradiction. "Truth" as a mere abstraction, the modern idealist feels—as John Norris already in the seventeenth century felt—can not be eternal all by itself, primarily because it can not, *as* an abstraction, be said to *be* at all. It is, moreover, a predicate that is meaningless except as related to a judgment; and a judgment is an activity of a concrete conscious mind. So much of the dialectic of humanism does latter-day idealism accept. Truth as a predicate of a judgment must, therefore, after all, have its subsistence in a conscious mind and be a specific quality or mode of relation in the actual experience of such a mind—must even, as Professor Royce tells us, be relative to the purposes and practical meanings of that mind. Only, since truth must be eternal, the mind that possesses it must also be eternal. And if the truth known by this mind is to have any pertinency to the truths we strive after and fancy we attain, that mind must be consubstantial with ours, its eternal judgments the fulfilment of our judgments, its timeless experience inclusive of our temporal experience. Thus concrete experience itself gets caught up into that eternity which was originally a peculiarity of "truth," when truth figured as a foil and contrast to the shifting stream of consciousness upon whose troubled surface it is now and then brokenly reflected.

Now, how eternalism is incompatible with the concrete idealism into which it historically develops when it seeks to make itself both coherent and pertinent to life, I have recently elsewhere endeavored to make plain; I shall not, therefore, repeat that argument. But, whether or not these two be incongruous, it must be noted that there is (among several others) one further argument for the doctrine of an eternal being which is at the same time an argument for idealism.

This is the argument—an interesting hybrid of dialectic and analytical psychology—which finds its finest expression in the second volume of Professor Royce's "The World and the Individual," but has its chief origins, I suppose, in Kant's painful reasonings about the "Synthetic Unity of Self-Consciousness"[3] as the prime condition of the possibility of experience *überhaupt*. If the argument already outlined is the Platonistic, this may be regarded as the peculiarly Kantian element in eternalistic idealism. It is worth recalling, as a matter of history, that Kant's problem concerning the conditions of the possibility of experience presented itself to him most acutely, perhaps, in the special form of the question: How is the experience of succession possible? To this question—which is assigned no special prominence in his favorite schematic analyses of his own system, but which none the less had a peculiarly important place in his reflection—Kant gives, if my arithmetic is right, not less than half a dozen different answers in different places in the two editions of the "Transcendental Analytic." The argument as presented by Kant is characteristically wavering and confused, and does not altogether unequivocally imply the reality of a strictly supratemporal ego. But as modernized and clarified, it runs substantially thus: The experience of succession can not be identified with *mere* succession. In order that succession may be known, the several successive moments must be present at once in consciousness, *i. e.*, non-successively, though with due recognition of the one-directional serial relation which their successiveness involves. This is true of any finite experience of the simplest case of temporal change; that experience both contains succession and yet transcends it, because the constituents of the succession, if it is to make up an experience, can not be mere *partes extra* or *ante partes*, as are the elements of a series merely as such, but must be synthetized in a single moment of consciousness. Every-day experience of time thus affords not only, within its own limits, a sort of sample of supratemporal being, but actually shows the necessity of holding every succession, so far as it is regarded as empirically real at all, to be presented in a single moment's consciousness that is not itself subject to succession. Thus the empirical reality of all time is rendered conceivable only if you posit a universal, supratemporal synthetic ego, which makes time possible by transcending it.

Now, this argument, if cogent, destroys, as I have said, *both*

[3] It is to be hoped that the practise of rendering the German *Apperception*, in Kantian usage, by "apperception" will soon come to an end. *Apperception* is, of course, the common term of German eighteenth-century psychology for "self-consciousness"—which is not at all the ordinary import of the same syllables in English.

metaphysical realism (new or old) and metaphysical temporalism. For to the realist succession, change, motion, must have an extra-mental reality; the before- and after-relation must be a real relation between real terms. Indeed, the relational theory of consciousness, or rather of cognition, which is perhaps the only new thing about the "new" realism, makes especially abundant use of temporal distinctions in its explanation of the relation of perception to its object. But if there can be no temporal distinctions except within the unity of a simultaneous consciousness, realism is rendered inadmissible by the same Kantian argument which is supposed to have disposed also of all *mere* temporalism.

Here, then, roughly recalled to memory are (not the only, but) the two principal lines of approach to the doctrine that reality is in the last analysis an eternal or supratemporal being. One of them, here designated the Platonistic, has its most natural affinities with a kind of Platonic realism, but has historically been converted into an idealism through the force of considerations not involved in its own essence. The other—the Kantian—argument directly implies *both* eternalism and idealism. The upshot in either case is the typical neo-Kantian compound: a concrete (which in its most plausible formulation means a monistic) eternalistic idealism.

Let us turn now to the arguments on the side of temporalism. A complete enumeration can not here be attempted; but the three that to me seem most significant must be mentioned. The first two are epistemological in character; that is, they go to show that truth is relevant solely to temporal situations, and means—when ascribed to any given judgment—only a concrete quality or relation within finite experience, to which a date and serial position may be assigned. The first, which has been set forth by most "pragmatists," but is perhaps most associated with the name of Professor Dewey, has its roots in an observation in genetic and functional psychology. A judgment, it is observed, is a phenomenon arising in the temporal existence of a being whose primary business is not to know, but to live, to adjust successfully inner relations to outer relations, or to revise old adjustments so that they may satisfactorily provide for the new content that constantly emerges in experience. Judgments being thus, when genetically and functionally considered, nothing but plans of action for dealing with novel situations or disturbances of equilibrium, then "truth" must be interpreted in the light of this their genesis and function; and it therefore can not consist in a mere correspondence of the judgment with a system of timeless validities or with any fixed facts which get none of their meaning from the nature of the given situation. The second argument that I have in mind is the nominalistic part of Professor James's pragmatism. In

this doctrine it is taken as a maxim of philosophical and scientific method that any abstract term is only an abridged, usually a collective, name for some concrete particulars definitely to be pointed at in the experience of an actual finite mind. The abstract noun "truth" or "trueness," then, must have its meaning resoluble into such a qualitatively specific kind of item in somebody's experience—or at least into some immediately known experience of relatedness. Trueness is realized when there occurs in experience a certain kind of conscious reference or pointing *in* one moment of time *at* the experience of another moment of time. This attempt at the completion of nominalism by the reduction of the quality of "truth" itself to empirical definiteness and particularity seems to me a decidedly interesting enterprise of the pragmatist, the historic significance of which has not always been sufficiently remarked.

These two arguments for epistemological temporalism I mention only for the sake of insisting that they *are* arguments for temporalism—that is, for the doctrine that thinking is essentially pertinent to a transitive process and that the meaning of truth is wholly definable in terms of inter-temporal relations between the parts of our successive experience. The success of these two modes of reasoning I do not wish to discuss, though I may confess incidentally that neither of them seems to me, by itself, altogether cogent as an argument. My purpose is rather to distinguish from them a third way of arguing to a temporalistic conclusion which is essentially dialectical and not epistemological. Such an argument proceeds to show two things: first, that—leaving aside all direct inquiry into the meaning of "truth"—the notion of an existent, realized, eternal being as including or having any relations to finite and temporal existence is logically self-contradictory; second, that the second or more peculiarly Kantian kind of argument for an eternal knower is, as used, a way of showing the conditions of the possibility of the experience of succession which really implies the *im*possibility of such experience.

This third or dialectical attack upon eternalistic idealism thus employs two assaulting columns. The first of these, which consists in the proof of an inconsistency between two parts of the idealistic system, I shall, as I have said, not attempt to employ on this occasion. The other argument, however, must be briefly explained, especially since the first may appear inconclusive without it.

The proposed Kantian proof of the eternity of true reality betrays a deep-reaching confusion of conceptual time with the real time of our inner life—of *thinking about* a transition with the transition itself. At least in us higher animals, to be sure, all time-

experience has its conceptual aspect. We can *think* a succession only in so far as the elements of that succession are simultaneously present to thought. And to experience succession is, in part, to think succession; to be conscious that we are slipping from one moment into another is at *each* of those moments to have before us some image or symbol of them both, at least some pointing or cross-reference in the one by which it in some sense transcends itself and includes somewhat of the other also. But to experience succession is not *merely* to think succession; it is also to live through a succession, to have some of the content of experience lose that unique qualitative character which we call presence, while other content, previously potential only, loses the unique qualitative character of futurity and bare potentiality, and gains that of presence. The several moments of the succession may, then, require to be thought together at once; but they can not be lived through all together at once. And that is the difference between living and pure thinking. Thought can and must transcend the moment, overleap temporal limits. But in so doing it also always falsifies the moment, it loses the unique *quale* of temporal transition itself, it lets the ineffable biting flavor of real experience escape.

All this, of course, is most obviously and most vividly illustrated by those emotional or conative attitudes which peculiarly depend upon the experience of real temporal transition. Assuredly, if I am to-day to think with anxiety of some future difficulty, that future must to-day be in some sense also present—may, indeed, be very clearly and fully presented. Yet it is not present in the sense in which my anxiety about it is present. The cake that I want must be present to my thought before I can want it; but it is not, alas!—in spite of all the consolations of idealistic philosophy—it is not present cake. There are, in short (to put the point a little differently) in our temporal experience two distinct things—a perception of succession and a succession of perceptions. Professor Royce's subtle reasonings concerning the former leave the latter untouched; for they wholly fail to show that the two notions are equivalent. Transition, change and becoming, are not simply predicates of objects *in* experience; they are also predicates *of* experience. The distinction can not be denied or ignored by any idealist who has abjured the ancient error of supposing that directly known qualities of actual experience can be disposed of by simply calling them illusion. Given, then, the fact that we not only have thoughts of succession, but also a real succession of thoughts, it follows that the latter can not be contained in any *totum simul* of consciousness, whether of a finite or of an absolute knower. And thus, as it appears to me, the second or Kantian type of argument for eternalism is refuted, and the reality

of an absolutely and irreducibly and untranscendibly temporal mode of being is established.

But with the settlement of the issue between metaphysical eternalism and temporalism, two of the other issues enumerated earlier in this paper are affected also. Realism, though it may still have, and I suspect will have, other embarrassments, is at least delivered from the objection resulting from that Kantian argument which purported to establish both idealism and eternalism by a single consideration. And some restrictions upon the self-confidence of rationalism must, I am afraid, follow from a recognition of the reality and the peculiar character of the time of immediate experience. I may not take space to argue this point, but must be content to end with a dogmatic expression of the conviction that real time is an aspect of reality highly resistant to any attempt at thoroughgoing conceptual clarification and rationalization. The obscurities and paradoxes which arise when we try to "think through" the conceptual implications of the temporal continuum have been familiar since the time of Gotama the Buddha and that of Zeno of Elea. In the case of a sort of thing of whose reality we could have no evidence except through ratiocination, such conceptual difficulties would be a sufficiently good reason for doubting its reality. But since we have an intuitive or appreciative knowledge of the reality of temporal transition, these difficulties must be construed as proving, not the unreality of the entity, or aspect of existence, to which they attach, but rather the inability of the principles governing our processes of conceptual thinking quite to cover or exhaust the whole nature of reality.

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REVIEWS AND ABSTRACTS OF LITERATURE

A First Book in Psychology. MARY WHITON CALKINS. New York: The Macmillan Company. 1910. Pp. xvi + 419.

The main text occupies only two thirds of the book; the remainder is devoted to an elaborate system of appendices. There are fifteen chapters, as follows: Introduction; Perception and Imagination; The Sensational Elements of Perception and Imagination; Perception and Imagination as Combination and Differentiation of Elements; The Bodily Reaction in Perception and Imagination; Attention; Productive Imagination, Memory, Successive Association; Recognition; Conception; Judgment and Reasoning; Emotion; Will; Faith and Belief; The Social Consciousness; and the Religious Consciousness. The appendix is divided into sections corresponding to these chapters and contains: "(1) Bibliograph-

ical lists and footnote references; (2) critical discussions of disputed problems in psychology, and supplementary notes upon topics briefly treated in the body of the book; (3) an account of the human body, in particular, of the nervous system and of the sense-organs, which amplifies the condensed statements of the preceding chapters; (4) a brief section on abnormal psychology; (5) a collection of questions, designed to test the student's first-hand understanding of the facts of psychology, and following the order of topics discussed in the successive chapters of the book." This sketch of contents reveals the two most striking features of the volume, namely, the standpoint of the self-psychology and the elaborate use of the appendix.

Professor Calkins, who is the foremost champion of the self-psychology, has here given us a clearly cut and forceful embodiment of her theory in a text-book. She recognizes the value of other points of view by pointing out that her earlier text-book, "An Introduction to Psychology," was written from two parallel standpoints, namely, the self and the structural (which she calls idea-psychology) and by aiming in the present book "to embody the important results of the so-called functional psychology."

Psychology is defined as "the science of the self as conscious." "This book has been written in the ever-strengthening conviction that psychology is most naturally, consistently, and effectively treated as a study of conscious selves."

Although the present author adheres more rigidly to the above definition of psychology than any other recent writer, it may well be asked if much of the richness of setting, numerous of the concrete descriptions and the most valuable interpretations, and the recognition of the results of purely objective experiments, are not introduced in violation of the definition. It does not seem to the reviewer that the self-psychology demands the restriction of scope imposed.

But the self-psychology is essentially a point of view in teaching. Is it advantageous? It has some advantage in that the study begins, and is, in large part, a study of immediate, concrete experience intact; it avoids confusion of the psychological and the physiological; it encourages introspection. On the other hand, there is danger of an aimless groping, for the object is not so specific and well set as by the structural method, or as logically precipitated as by the functional method; it does not in itself encourage systematic exhaustiveness; it probably appeals more to the person who has some knowledge of the subject than to the beginner. Introductory books now depend upon the teacher. This book can undoubtedly be used to advantage as a text, especially as the reviewer proposes to use it, parallel with text-books from other points of view.

The self of this psychology is the empirical self; the author is therefore not open to the charge of making any unwarranted metaphysical assumption in regard to the reality of the ego. The author is in good company in maintaining this definition. The view has the merit of giving us a descriptive and explanatory account in pure and undoubted psychological terms, in harmony with the doctrine that the conscious is co-extensive with the mental, and that (although it is not clear) the self is

to be regarded as a purely psychological rather than a psychophysical organism. But this leads to the omission or minimizing of much that is generally recognized as psychological. Thus, instinct is relegated to the appendix; habit is passed by with incidental mention; ideo-motor action is treated lightly; the subliminal and automatic aspects of the sensory processes are neglected; the sense of equilibrium is ignored; the purely objective method of experiment is rejected; the concept of the subconscious is explained away; in general, the automatic aspects of the psychophysical organism are left out of account both in description and in interpretation.

The division of the book into a uniform text with a large amount of material in the appendix is a step in advance, although it has pedagogical disadvantage. It makes possible a uniformity of value, balance, and continuity in the text, and the introduction of desirable accessory, technical, and theoretical material in the appendix.

The self-psychology will have a fair trial in this book, which is lucid, systematic, and pithy in language and treatment and has a wholesome scientific, artistic, and philosophical setting.

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A Study of Association in Insanity. GRACE HELEN KENT and A. J. ROSANOFF. *American Journal of Insanity,* Vol. LXVII., No. 1, pp. 37–96.

This study represents a determined and thoroughgoing effort to eliminate subjective sources of error in dealing with free association material.[1] The experiments described consist of a series of 100 stimulus words to which responses were obtained from 1,000 subjects, aggregating a considerably greater material than has previously been concentrated upon this topic. The 100 stimulus words are of varying degrees of familiarity, but, according to the writers, are selected rather for their unlikelihood of arousing special "personal experiences in ordinary subjects." However, the part played by special experience in the responses depends very much more upon the temperament of the subject than the actual character of the stimulus words. This temperamental tendency is, of course, precisely what the investigators wish to adapt the test to measure.

The authors raise the natural objections against the "logical" methods of classifying the responses, of which, indeed, save for special purposes, their frequency tables largely eliminate the need. These frequency tables occupy four fifths the space of the report. Each of the thousand responses to each of the hundred stimulus words is enumerated in alphabetical order, with the indication of its frequency. Thus to the stimulus word *table,* the response *article* occurs 3 times, *board* 14 times, *chair* 267 times. The greatest number of different response words was to *anger,* 280; the fewest to *needle,* 72. These tables thus constitute a dictionary of associations,

[1] This is the portion of the paper of greatest interest to normal psychology. The second portion of the report, dealing mainly with pathological cases, has since appeared in the *American Journal of Insanity,* Vol. LXVII., No. 2, p. 317.

by means of which the individuality of any response to the stimulus words of the series may be determined. It is this measure of the individuality of the response that forms the starting-point of the author's suggestions for application.

For some time back the varying individuality (*resp.* egocentricity) in the reactions of different individuals to the association test has been observed, and in a vague way it has been possible to see a certain pathological significance in extreme individuality of response. The "normal" train of thought reacts in a "normal" way, the abnormal train of thought in an abnormal way, but it is only through such investigations as are here reported that any certainty can be reached as to what are "normal" and what are "abnormal" ways of reacting.

Individuality of response must to some extent be favored by richness of intellectual experience, so that there is not unnaturally a somewhat higher average of individual responses among educated than among uneducated subjects, but the variabilities in either group are so great that the authors do not feel justified in saying that education shows any specific tendency to increase the number of individual responses. On the other hand, it seems that the individuality of response is much increased in various forms of mental disease, and that also the presence of somewhat less abnormal reaction types may be indicated in an unusual tendency to individual association. Ordinary experience would perhaps enable one to guess such a condition, but the given tables enable one to check and measure it in the objective and quantitative way.

Too much stress can not be laid upon the reduction of the association test by these frequency tables to the bases of a thoroughly empirical standard. It may of course be objected that the infrequency of a response is not a criterion of individuality, since a "common" response might still be the product of highly specialized experience. In single observations this factor might be more serious, but over a number of associations, the habitual tendency to react in an individual way can scarcely fail to lead to responses infrequent and non-existent in the tables, so that this difficulty proves more apparent than real.

For a knowledge of the practical results and applications of the method thus developed, it is necessary to await the continuation of the report. Meanwhile the frequency tables here published are a *thesaurus* of material in this experiment quite indispensable to the serious student of the subject.

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A Critical Study of Current Theories of Moral Education. JOSEPH K. HART. University of Chicago Press. 1910. Pp. 47.

The author objects to most current systems and theories of moral education as being "external" and unrelated in any genuine way to a child's activities. These systems expect the child "to absorb ready-made ideas," *i. e.,* to become moral by being lectured to on morals. He finds the English ideal of "the corporate life of the school" more promising but contends that "no isolated concrete community, such as a school, can

fully represent the world of action to-day, and that, accordingly, the practise in social habits attained in such a community will not insure complete social functioning in the larger community of the world."

The concrete educational problem of to-day is stated as follows: "How shall we relate the various partial forms of educational activity of the present systems to the complete and concrete unity of the social process, so that these partial aspects of life shall be made to open out upon that world of complete human activity in which, alone, whether for education or for occupation, the individual can actually find the social support, coercion, and constructive criticism which give vitality and meaning to individual endeavor? How shall the implicit values of primitive education be restored in explicit form in the complicated world of the present?" The solution of this problem is indicated only in the most general way. From the standpoint of social psychology the aim of education is the development of the self. The following sentences seem to the reviewer the most significant part of the dissertation. "*The powers of the self have to be developed, through the development of a world calling for those powers.* The self reflects the world that it lives in, *i. e.*, that has risen into consciousness with it. Education has, accordingly, the problem of providing for such creative situations in the developing experience as shall insure the rise of the larger self, and the more inclusive world."

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JOURNALS AND NEW BOOKS

THE INTERNATIONAL JOURNAL OF ETHICS. July, 1910. *The Moral Ideal* (pp. 387–394): FELIX ADLER. – In consequence of the increased differentiation of society the moral ideal must be described as a perfect society instead of as a perfect individual. *Charity Organization and the Majority Report* (pp. 395–408): B. BOSANQUET. – A reply to the criticisms of the Majority Report by Professor Jones in the January issue of this JOURNAL. *The Classification of Ethical Theories* (pp. 408–424): JAY WILLIAM HUDSON. – A valid classification should exhibit (1) the fundamental problem of ethics, (2) the essential relations of historic systems to each other, (3) all logically possible systems. This fundamental problem is that of the ethical norm which is some form of ideal self. Hence a threefold classification according as the self is conceived in ideational, affective, or volitional terms. *Spencer as an Ethical Teacher* (pp. 424–437): H. S. SHELTON. – "Although, in the opinion of many, Spencer's additions to ethics will not rank so high as other parts of his philosophy, it would be difficult to find any modern thinker whose ethical work is more original, and more likely to be of permanent value." *Retribution and Deterrence in the Moral Judgments of Common Sense* (pp. 438–453): F. C. SHARP and M. C. OTTO. – A second paper giving the results of a study of the moral judgments of groups of students at the University of Wisconsin. No one consistently maintained standard was

found at the basis of these judgments. Most people will "demand retribution under one or another condition. But the majority do not demand it until the deed, including the attitude of the doer toward the deed, reaches a certain degree of repulsiveness." *The Moral Mission of the Public School* (pp. 454–470): CHARLES HUGHES JOHNSTON. – A discussion of the "Report on Moral Instruction and Training in Schools" edited by M. E. Sadler. The moral mission of the school is to induct the child "into social life by some sort of reproduced social activity. An understanding of modern complex social and industrial environment, with hygienic insight, idealized, will surely largely constitute our moral equipment." *Religion: a Luxury or a Duty* (pp. 470–481): NORMAN WILDE. – An analysis of the ethical implications of three types of religious theory: Pantheistic Realism, Theistic Realism, and Theistic Idealism. *Book Reviews:* A. W. Benn, *Revaluations: Historical and Ideal:* A. E. TAYLOR. Stanton Coit, *National Idealism and the Book of Common Prayer:* S. H. MELLONE. C. F. Dole, *The Ethics of Progress:* G. S. PATTON. Hans Driesch, *The Science and Philosophy of the Organism* (Vol. II.): M. LIGHTFOOT EASTWOOD. Benedetto Croce, *Esthetic as Science of Expression and General Linguistic:* F. MELIAN STAWELL. R. G. Bury, *The Symposium of Plato:* S. WATERLOW. Auguste Diès, *Le Cycle Mystique: La Divinité d'Origine et Fin des Existences Individuelles dans la Philosophie Antésocratique:* S. WATERLOW. Auguste Diès, *La Définition de l'être et la Nature des Idées dans le Sophiste de Platon:* S. WATERLOW. R. M. Wenley, *Modern Thought and the Crisis in Belief:* EDMUND H. HOLLANDS. Frank C. Doan, *Religion and the Modern Mind.* Bernard Pick, *Paralipomena: Remains of Gospels and Sayings of Christ:* NATHANIEL SCHMIDT. Henry S. Salt, *Tennyson as a Thinker:* W. J. ROBERTS.

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NOTES AND NEWS

T. WARD CLARKE contributes a suggestive note on the "Problem of Elemental Life" for *Science,* November 18. The note is inspired by the remarkable researches of Drs. Carrel and Burrows, of the Rockefeller Institute for Medical Research, into the growth of life tissues outside of the animal body. A preliminary notice of the results of these researches appeared in *The Journal of the American Medical Association* for October 15 and 29. We take the following from Dr. Clarke's account: "The experiments consisted in removing bits of tissue from mammals immediately after killing them, the most minute precaution being taken to procure asepsis, inoculating the tissue into a drop of plasmatic medium made from the same animal, sealing it in a hanging drop slide, placing it in a thermostat at 37° C., and observing the changes in the tissue by means of a microscope enclosed in a warm chamber kept at the same temperature. The results of the experiments were uniform. In every case after from one to three days, growth of the specimen was observed. After a period of quiescence, varying according to the nature of the tissue, granulations made their appearance at the margin of the tissue fragment, spindle and polygonal cells were formed and rapidly grew out into the surrounding lymph. The new tissue had many characteristics of the parent material; cartilage produced cartilage; spleen formed cells closely resembling splenic pulp; and, most striking of all, from the surface of bits of kidney grew cell tubules, replicæ of the normal kidney tubes. Once started, the growth went on with wild rapidity, the cells branching out in all directions, and the process continuing for days until the nutritive power of the plasmatic medium was exhausted, and then, when once stopped by inanition, immediately becoming reactivated upon reinoculation into fresh plasma. Furthermore, fragments of the newly formed tissue removed from the parent mass and placed in fresh media continued the same active prolific growth as before their separation, the second generation of cells closely resembling the first. The speed of growth of the tissues varied according to the nature of the material; cartilage began to grow after three days and progressed slowly; peritoneal endothelium and arterial sheath were also slow in starting and sluggish in progress; thyroid and spleen were more active, showing changes in from thirty-six to forty-eight hours; while in the case of kidney, proliferation was seen after twelve hours in the thermostat. Most interesting of all, however, was the behavior of tumor tissue. In their first article the authors report definite growth of a bit of chicken sarcoma after nine hours, and in the second publication a specimen of the same tumor had been actively growing two and one half hours after inoculation. Still another specimen of the same tumor, on being measured twenty-four hours after inoculation, was found to have increased in size fourteen fold, and after forty-eight hours twenty-two fold, the changes being plainly visible to the naked eye. It is impossible at the present time to esti-

mate the value of these observations. From the view point of the biologist the production of active manifest life—for where there is cell proliferation and growth there is manifested an active life process—is of infinite academic interest. From the philosophical standpoint a new factor is added to the great problem of life and death. To the mind of the experimental worker in medical science an entirely new field of possibility is thrown open for the study of cancer. Now that it is possible actually to see tumor cells grow and to study directly the various factors which stimulate or retard that growth, it is not extravagant to say that a gigantic stride has been taken toward the discovery of the cause of cancer and the ultimate goal of its prevention and cure."

PROFESSOR CLAPARÈDE contributes a very appreciative account of Professor James to the September number of the *Archives de Psychologie.* The following tribute to the broad humanity of Professor James indicates how fully his personality was appreciated abroad: "En William James, ce n'est pas seulement un psychologue pénétrant, un profond philosophe que perd l'humanité, c'est un homme—un homme dans l'acception la plus haute, la plus intégrale de ce mot, un homme vivant, vivant dans la pléntitude de son fonctionnement total, n'ayant abdiqué aucune des capacités ou facultés dont chaque homme a le libre usage, et cherchant même à réveiller, pour les mettre en valeur, les énergies potentielles sommeillant dans le tréfonds de notre être. Et cet homme, il est un de ceux qui l'a le mieux comprise, cette humanité, qui en a le plus profondément saisi, et surtout *senti* les aspects infinis, les formes multiples, les aspirations ardentes, quoique souvent secrètes. On ne saurait imaginer esprit plus large, plus tolérant, plus compréhensif, plus dégagé de toute pédanterie, de tout mesquin préjugé de classe ou d'école. Jamais l'opinion reçue n'est venue barrer son regard, voiler son horizon. Sa qualité dominante, d'où les autres découlaient tout naturellement, c'était son sens de la vie, de la réalité, et avant tout de cette réalité, qui est peut-être la seule, qui est du moins la seule à laquelle nous puissions atteindre, la réalité 'vécue,' la réalité humaine. Cette qualité, il l'a appliquée tour à tour à l'analyse psychologique et à sa conception de la vie, à l'étude de la pensée et à celle de l'action."

THE Section of Anthropology and Psychology of the New York Academy of Sciences met on November 28 in conjunction with the New York branch of the American Psychological Association. There was an afternoon session held in the psychological laboratory of Columbia University, and an evening session at the American Museum of Natural History. The following papers were offered and discussed: "Practise Effects in Free Association," F. Lyman Wells; "Drowsiness," H. L. Hollingworth; "Mental Hygiene," Clyde Furst; "Subjectifying the Objective," D. S. Miller; "Secondary Qualities," F. J. E. Woodbridge; "A Forgotten Pragmatist, Ludwig Feuerbach," Robert H. Lowie.